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ABSTRACT

This guide provides summaries of federal programs in the physical and mathematical sciences of interest to colleges and universities. Programs from the following federal agencies are included: National Science Foundation; Department of Energy; Environmental Protection Agency; Office of Education; Department of Interior; Smithsonian Institution; Department of State; and Department of Transportation. For some programs information is provided on the number and amounts of grants awarded, when applications are accepted, and whether the grants are made to institutions or individuals. (SW)

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A Guide to Federal Funding in the Physical and Mathematical Sciences

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NATIONAL INSTITUTE OF EDUCATION

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INTRODUCTION

This guide provides summaries of federal programs in the physical and mathematical sciences of interest to colleges and universities. Programs from the following federal agencies are included: National Science Foundation; Department of Energy; Environmental Protection Agency; Office of Education; Department of Interior; Smithsonian Institution; Department of State; and Department of Transportation.

A GUIDE TO FEDERAL FUNDING IN THE PHYSICAL AND MATHEMATICAL SCIENCES

By

Myra Ficklen

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NATIONAL SCIENCE FOUNDATION

DIRECTORATE FOR SCIENCE EDUCATION

DIVISION OF SCIENTIFIC PERSONNEL IMPROVEMENT (47.049)

SCIENCE FACULTY PROFESSIONAL DEVELOPMENT PROGRAM

- grants for full-time college science teachers engaged primarily in undergraduate teaching. Awards are to increase competence in the professor's field by studying or working at another institution for three to twelve months. Projects may be carried out during three consecutive summers. NSF particularly encourages projects for college teachers to work in an industrial setting. Stipend support is based on salary and includes a travel allowance to and from the affiliate institution.

Applicants must submit an activities program indicating the plan of study. Applications are evaluated on 1) the potential of the activities program to contribute to the applicant's development as a science teacher; 2) evidence that the applicant can carry out the plan; 3) appropriateness of the proposed institution of affiliation and tenure period; and 4) evidence of past accomplishments as a science teacher. Deadline is usually December. NSF makes approximately 130 awards each year.

CHAUTAUQUA-TYPE SHORT COURSES

- support for short courses for college science faculty in a variety of topics at field centers throughout the U.S. NSF provides support for lodging, instructional materials, and partial travel costs. Each course meets for a total of four days - two in the fall and two in the spring. During the interim participants work on projects related to the course. Topics have included "Energy Systems", "The New Geology: Impact of Plate Tectonics on Geological Theory", and "Lasers and Their Applications in the Physical Sciences".

AAAS administers the program for NSF. Announcements of course schedules are usually available in July or August, with selection of participants about two to four weeks prior to the beginning of the course.

GRADUATE FELLOWSHIPS

- fellowships of approximately $325 per month for the most talented scientists to pursue graduate training. Approximately 550 new awards and 1000 continuation awards are made each year. Applicants must, at the time of application, have not completed more than 18 quarter hours/12 semester hours of post-baccalaureate study. No student may receive more than three years of NSF graduate fellowship support.

NATO POSTDOCTORAL FELLOWSHIPS

- grants for full-time postdoctoral study in a NATO country (excluding the U.S.) for periods of nine to twelve months. Applicants must have earned doctoral degrees (usually within the past five years) or have equivalent research training or experience. Evaluation of the applicants is based on academic records, letters of recommendation, ability to carry out proposed research and other evidence

of scientific competence. Consideration is also given to the applicant's competence in the language of the country in which he/she plans to study. NSF particularly encourages projects which contribute to international collaboration in science. NSF makes approximately 40 awards each year. The deadline is in November.

NATO ADVANCED STUDY INSTITUTES TRAVEL GRANTS

- grants to selected NATO Advanced Study Institutes for use as travel grants for participating U.S. students. Institutes are generally held during the summer and are intended to provide advanced instruction on highly specialized topics in an environment which will promote international exchange and cooperation. Advanced graduate and postdoctoral students and junior-level faculty are eligible. Applicants must be nominated by the institute director. Announcement of the institutes is usually in February, but deadlines differ according to the institute. Approximately 70 students receive travel awards.

NATIONAL NEEDS POSTDOCTORAL FELLOWSHIPS

-grants for research related to significant national needs to individuals who have received their doctorates within the past five years. (Awards are not made in clinical, education or business fields, nor history, social work or public health.) Tenure of the award is generally six to nine months. Fellows are selected on the basis of academic records, letters of recommendation and other indications of scientific excellence. NSF makes approximately 100 awards per year. The deadline is in December.

PRE-COLLEGE TEACHER DEVELOPMENT IN SCIENCE

- grants to colleges and universities for workshops designed to improve elementary and secondary school teachers' knowledge of scientific subjects. Projects should be developed in close collaboration with teachers and other education personnel at the levels at which the project will focus. Projects may be academic year workshops, with sessions held regularly during the academic year or summer seminars for full-time study over a one to four-week period. The maximum grant is $50,000. In the first year of the program NSF made 185 awards; expectations are to make 30-35 awards per year in future years. Deadline is usually November.

UNDERGRADUATE RESEARCH PARTICIPATION

- institutional grants to allow up to 12 undergraduate students to work full-time with faculty during the summer on a research project. Funds cover student stipends plus cost of operating the project. NSF emphasizes that a project should provide a complete research experience for the student, so he/she can have a sense of accomplishing a task. High priority is given to research projects dealing with environmental and societal issues. NSF makes about 200 awards each year. Deadline is in August.

SECONDARY SCHOOL STUDENT SCIENCE TRAINING

- grants to higher education institutions or other associations to provide high ability high school students with research experience or college level instruction. Approximately 125 grants are made for projects with some 4400 participants. Projects cover all fields; they should be designed to offer guidance and encouragement to high school students with strong potential for scientific careers. Grants range from $4,000 to $20,000. Deadline is in September.

WOMEN IN SCIENCE

- grants to institutions for Science Career Workshops for Women at the freshman-sophomore; junior-senior; or graduate level and for women who have a bachelor's degree in science but are neither in graduate school nor employed in scientific jobs. Workshops should be multidisciplinary and provide candid information and guidance on careers and educational opportunities in sciences for women. Each workshop should accommodate 100 to 500 participants from a radius of 100 miles. The maximum grant from NSF is $10,000. NSF places considerable emphasis on evaluation plans and utilization of the results of the workshops. This program is still in experimental stages, so changes in guidelines may occur from year to year. NSF makes approximately 25 grants each year. The deadline is in December.

HANDICAPPED IN SCIENCE

- grants for conferences, workshops, studies and science training models to identify and seek solutions to the problems of the physically handicapped becoming scientists. Career guidance information, student science training projects, as well as needs assessments and surveys are funded. NSF makes approximately ten to twelve awards each year. The maximum grant is $50,000. Deadline is in November.

DIVISION OF SCIENCE EDUCATION RESOURCES IMPROVEMENT (47.048)

COMPREHENSIVE ASSISTANCE TO UNDERGRADUATE SCIENCE EDUCATION (CAUSE)

- grants to two and four year colleges and universities to strengthen undergraduate science programs, improve the quality of teaching and help institutions enhance and evaluate science education programs. Projects may involve alternative teaching methods - including use of audio-visual equipment, computers, etc. as learning tools; remedial instruction; or other activities aimed at improving an instructional program. Proposals require a local review statement indicating how the proposed activities fit into the overall goals of the institution. The maximum grant is $250,000 over a three-year period, with a one-third cost sharing required. Funds may be used for salaries, equipment, minor renovation of facilities, faculty travel, indirect costs and other expense items attributable to the project. NSF makes 60-70 awards each year. Deadline is in December.

LOCAL COURSE IMPROVEMENT PROGRAM (LOCI)

- grants to colleges and universities to help restructure a course(s), try out new scientific and educational techniques on a small scale. Much of the planning for the course can take place during the summer months. Projects should be designed to meet the local needs on a campus and need not be model projects. Grants range from $3,500 to $25,000 with a one-third cost sharing required. NSF makes approximately 130 awards each year. Deadline is in October.

INSTRUCTIONAL SCIENTIFIC EQUIPMENT PROGRAM

- grants up to $20,000 which must be matched on a dollar for dollar basis, for purchase of equipment needed to improve instruction in the classroom. Equipment purchase must be tied to course improvement. Institutions can submit from one to five proposals (based on FTE); NSF allows only one award per discipline every three years. Deadline is in March.

MINORITY INSTITUTIONS SCIENCE IMPROVEMENT PROGRAM (MISIP)

- grants to institutions which draw over fifty percent of their enrollments from ethnic minorities, to 1) improve the quality and preparation of their students for graduate work or careers in science; 2) increase the number of minority students with majors in science; 3) and improve the capability of minority institutions in the area of institutional planning and development, so that they can compete more effectively in assistance programs not specifically intended for minority groups. Three types of grants are available: design grants; grants to individual institutions for comprehensive science improvement; and grants to support a cooperative project among several institutions. Design grants provide up to $20,000 over a twelve-month period to help in development of long-range science improvement plans. Only institutions which do not have formal planning capabilities (PME systems, federal relations, institutional research or development offices) are eligible. Institutional and cooperative projects may request up to $300,000 for a three-year period to implement science improvement plans through a variety of activities including faculty development, advanced science seminars, faculty exchange, new curricula, etc. (Non-minority institutions can participate in cooperative projects.) The deadline is in March.

INFORMATION DISSEMINATION

- support for projects designed to assist school system representatives and others concerned with education at the pre-college level to learn about new and alternative instructional materials, classroom practices and recent science education research findings. Activities can include conferences, information exchange systems or other means of disseminating information. The maximum grant is $25,000. Deadline is in February.

EXPERIMENTAL PROJECTS FOR IMPROVEMENT OF SCIENCE EDUCATION RESOURCES

- grants for a limited number of projects which relate to the objectives of the division but do not fall into one of the established program areas. Eligible projects are those which seem likely to 1) provide an important source of information for potential new thrusts or improved effectiveness in one of the existing programs or 2) serve as an external indication for future new programs of the Science Education Directorate. Proposals are handled on a case by case basis.

DIVISION OF SCIENCE EDUCATION DEVELOPMENT AND RESEARCH (47.048)

RESEARCH IN SCIENCE EDUCATION

- support for research in science education in all disciplines. Projects must be designed to generate new knowledge which will lead to more effective science education and better uses of educational resources. Current areas of interest include problems of motivation and learning in adolescents and developmental attitudes in science. Where possible, NSF encourages collaboration between educational researchers and those with experience in science education. NSF makes approximately 20 awards each year. Deadline is in March.

DEVELOPMENT IN SCIENCE EDUCATION

- support for innovative methods and materials which can serve as models in science education. Projects should represent a significant departure from usual practices in science education and show promise of providing a practical

transferable product. Priority areas are determined each year. In FY 1978 awards are limited to on-going projects and selected projects in continuing education.

DIVISION OF SCIENCE AND SOCIETY (47.038)

ETHICS AND VALUES IN SCIENCE AND TECHNOLOGY

- grants for projects, including research, workshops, conferences and other activities designed to increase understanding and interaction between the scientific and technological communities, other professional communities, and the general public in the following substantive categories: 1) value issues in the professional education and conduct of scientists and engineers; 2) value issues associated with technological innovation; and 3) value issues in institutional choices. Sharpness of focus on issues related to the ethical and social dimensions, relative social importance of the general area within which the project falls, originality and clarity of methods, evaluation in achieving specific goals are the major review criteria. Preliminary proposals are due in January, May and September, with full proposals due in April, August and December.

SCIENCE FOR CITIZENS FORUMS, CONFERENCES AND WORKSHOP PROGRAM

- grants to citizen groups and other nonprofit organizations to bring together citizens and scientists to provide citizens with access to scientific expertise on science-related policy issues of interest to citizens. NSF is particularly eager to serve groups which do not normally have easy access to scientific expertise. Colleges and universities should work with such groups in developing proposals. The most successful proposals have been those which deal with specific problem areas, not vague general concepts such as "the energy problem." Preliminary proposals are due in March, full proposals in May. NSF awards approximately 20 grants each year.

PUBLIC SERVICE INTERNSHIPS AND RESIDENCIES

- grants to provide scientists and engineers an opportunity to work for up to one year in public service organizations or with citizen groups. Applicants must make arrangements with an appropriate host organization and propose a suitable activity. Proposals should emphasize the scientific, public service and out-reach objectives of the program and indicate how the activity will contribute to the ongoing program of the host organization. NSF gives priority to applications in which the proposed activities are intended to reach groups that normally do not have access to scientific expertise and information.

Each year NSF awards 15 to 25 each of internships and residencies. An applicant for a residency must have earned a final postgraduate or professional degree or have acquired comparable experience in an eligible field. Applicants for internships must be enrolled in an appropriate undergraduate or graduate program and have completed at least three years of undergraduate study with a major in science or engineering. The deadline is usually in March.

PUBLIC UNDERSTANDING OF SCIENCE

- grants to direct projects to increase the general understanding of science and technology and the effects of scientific methods and activities on our lives. Activities can include radio and television programs, newspaper and magazine presentations, museum and science center exhibits, drama and film presentations,

and lectures, forums, conferences and workshops. In addition, projects to improve methods of communication with the public and studies of those methods of communications with the public are also funded. Projects should be transferable and applicable to a large group, be cost effective, reach audiences not effectively reached by existing informal education programs and utilize modes of communication. Preliminary proposals may be submitted at any time. Staff attempts to respond within eight weeks. Closing dates for formal proposals are: April, August and December.

MATHEMATICAL AND PHYSICAL SCIENCES AND ENGINEERING (47.049)

Grants to support projects, research workshops, symposia and conferences, the purchase of scientific equipment for research and travel to selected international meetings. Research projects generally are for periods of up to 24 months; cost-sharing by the institution is required. Program areas are:

1. Mathematical Sciences - classical analysis and geometry; topology and foundations; applied mathematics and statistics; modern analysis and probability; algebra.
2. Computer Science Research - theoretical computer science; software systems science; software engineering; intelligent systems; computer systems design; special projects.
3. Physics - elementary particle physics; intermediate energy physics; nuclear physics; atomic, molecular and plasma physics; theoretical physics; gravitational physics.
4. Chemistry - chemical thermodynamics; quantum chemistry; chemical dynamics; chemical analysis; structural chemistry; synthetic inorganic and organometallic chemistry; synthetic organic and natural products chemistry; chemical instrumentation.
5. Engineering - automation, bioengineering and sensing systems; devices and waves; electrical and optical communications; system theory and applications; chemical processes; heat transfer; solid and particulate processing; structural, materials and geotechnical engineering; fluid mechanics; solid mechanics; water resources; urban and environmental engineering.
6. Materials Research - solid state physics; solid state chemistry; quantum solids and liquids; metallurgy; ceramics; polymers.

SMALL COLLEGE FACULTY ENGAGED IN RESEARCH AT LARGER INSTITUTIONS

- opportunities for faculty members at smaller institutions to participate in original and basic research being conducted at larger institutions through supplemental grants to project directors. There are no formal guidelines or application forms; the procedure is:

1. Faculty member locates a researcher in his field of interest who has an NSF grant.
2. Faculty member then contacts the researcher and persuades the latter to accept him as an associate for the agreed-upon period of time (summer, semester, etc.)
3. The researcher requests a supplemental grant to cover the budget changes.

There is no deadline, but arrangements take at least six months. Available funds vary with different divisions. NSF makes approximately 100 such grants each year.

RESEARCH INITIATION IN MINORITY INSTITUTIONS

- grants for up to 36 months with a maximum award of $35,000 for research projects at institutions whose enrollments are composed predominantly of ethnic minorities. The deadline is March.

INDUSTRY/UNIVERSITY COOPERATIVE RESEARCH ACTIVITY

- grants to encourage cooperation between universities and industrial firms. Proposals must be prepared jointly by their respective institutions. Research should focus on fundamental scientific questions, rather than on technological development. Proposals are submitted to the directorate for Biological, Behavioral and Social Science, but identified as candidates for the industry, university cooperation. The most important criteria in evaluating proposals is scientific excellence. However, potential of the research to enhance cooperation between academic and industrial organizations will also be a factor.

DOCTORAL DISSERTATION RESEARCH

-grants to improve the scientific quality of dissertations in the sciences. Funds may be used for acquisition of data and means for its analysis that would otherwise not be available. Scientific content, importance, originality and evidence that a grant will significantly increase the potential scientific contribution of the research are the principal considerations in making awards.

ASTRONOMICAL, ATMOSPHERIC, EARTH AND OCEAN SCIENCES (47.050)

ASTRONOMICAL SCIENCES

- support for projects designed to increase man's knowledge of the universe by examining the physical principles governing the universe, the structures of the planets and their atmospheres, the solar system, the Milky Way and remote galaxies. In addition, NSF provides support for development and operation of five National Astronomy Observatories where equipment and facilities are made available on a competitive basis to qualified scientists for performance of independent research. Proposals may be submitted at any time, but require approximately six months for review. Program areas include: solar system astronomy; stars and stellar evolution; stellar systems and motions; galactic and extragalactic astronomy; astronomical instrumentation and development; radio spectrum management.

ATMOSPHERIC SCIENCES

- support for fundamental research in Atmospheric Sciences. Specific foci of the division include development of scientific basis for understanding climate and weather; development of scientific basis for understanding the neutral global cycles of gases and particles in the earth's atmosphere; to improve ability to understand the behavior of environmental factors which control air quality in the troposphere and stratosphere; improve our knowledge of the sun and neighboring planets. Program areas are: aeronomy; atmospheric chemistry; meteorology; solar terrestrial.

CLIMATE DYNAMICS PROGRAM

- support for research which will contribute to understanding of the physical processes governing climate. Program areas are: modern climate data assembly and analysis; paleoclimate data assembly and analysis; climate simulation and modeling; climate modification and impact assessment.

EARTH SCIENCES

- support for research to obtain basic information about the nature, origin, history and behavior of rock formations. The research areas focus on geology, geochemistry and geophysics.

OCEAN SCIENCES

- support for individual scientists and their graduate students at academic institutions to carry out research leading to better understanding of the nature of the ocean and its influence on human life. Program areas include physical oceanography, marine chemistry, submarine geology and geophysics, and biological oceanography.

SCIENTIFIC, TECHNOLOGICAL AND INTERNATIONAL AFFAIRS (47.053)

Support for programs with international dimensions in basic and applied research. Projects generally fall into one of the following areas:

1. Joint seminars or workshops - usually involve 20-25 experts to help design and develop joint research projects.
2. Cooperative research - U.S. scientists work with scientists of another country, with the two countries sharing costs. Proposals must be submitted to agencies in both countries simultaneously; both sides must approve the plan. Fundability often depends on the interest of the other country. Countries and areas with which the U.S. has formal agreements are: Australia; Republic of China; Romania; Hungary; Czechoslovakia; Bulgaria; France; India; Israel; USSR; Italy; Japan; Latin America; New Zealand. Agreements with each country vary as do research areas of interest.
3. Visiting scientists - payment of partial costs for scientists to go abroad to conduct research; visits can be short or last for a semester or year.
4. Special foreign currency program - support for scientists to carry out research in countries in which the U.S. owns excess currency (expected to be India, Pakistan and Egypt).
5. International travel program - grants for approximately 250 scientists to attend significant international meetings at which they are delivering papers.

Size of grants varies widely according to the project. Generally travel grants do not exceed $1,200. Proposals are accepted throughout the year in most categories. NSF particularly encourages young investigators to work on cooperative research efforts.

SCIENTISTS AND ENGINEERS IN ECONOMIC DEVELOPMENT (SEED)

- grants for scientists or engineers to conduct research or teach in one of

the 45 participating developing countries. Applicants must have at least five years of postdoctoral or equivalent experience in teaching or research and plan to return to his/her institution when the project is complete. Deadline is usually in December.

APPLIED SCIENCE AND RESEARCH APPLICATIONS
(Replaces Research Applied to National Needs)

PHYSICAL, MATHEMATICAL AND ENGINEERING APPLICATIONS

- support for research that seeks to facilitate application of technological innovations for long-run improvements in industrial process, materials availability and handling and increased efficiency. This area also supports applied research which builds on fundamental research in such areas as catalysis, laser chemistry, and mathematics.

GEOPHYSICAL AND ENVIRONMENTAL APPLICATIONS

- support for research to accelerate the rate of technological innovations based on advances in the oceanographic and earth sciences. These include methods for exploiting ocean resources, techniques for utilizing coastal and estuary areas for resource production, and the improvement of techniques and sensing devices for exploration and extraction of minerals from land areas.

DIVISION OF PROBLEM-FOCUSED RESEARCH APPLICATIONS

- support for research and proof-of-concept experiments on selected problem areas in order to 1) facilitate the incorporation of science as a working tool for problem resolution in the public and private sectors; 2) provide support for problem-focused research that bridges from basic research discoveries and applications; and 3) enhance the capability and capacity of non-traditional research users to employ research results and methods. Areas of research include Chemical Threats to Man and the Environment; Earthquake Hazards Mitigation; Community Water Management; and Alternative Biological Sources of Materials.

DEPARTMENT OF ENERGY

The following descriptions will provide an overview of program opportunities within the Department of Energy. Most of the money available for research goes to a small number of large research institutions which have extensive facilities and on-going programs. Smaller institutions will fare better in the Education Programs Division for use of facilities at national labs and training programs.

EDUCATION PROGRAMS DIVISION

UNIVERSITY-LABORATORY COOPERATIVE PROGRAM (24.004)
(Faculty and Student Participation-Laboratory Cooperative Program)

- provides opportunities to college and university science and engineering faculty and students, usually during the summer, for research training and experience in areas of energy research at one of thirty or more DOE Laboratories, Contractors or Energy Research Centers. The program is open to juniors and seniors at the baccalaureate level, graduate students working on their master's and doctoral degrees, and college/university faculty. These labs provide a variety of opportunities for faculty and students.

FACULTY DEVELOPMENT PROGRAM (24.007)

- support for summer workshops to help improve the teacher's ability in energy education by developing an understanding of a wide range of energy topics and more effective means of communicating this understanding to students. Workshops usually last from one to three weeks and involve 25-40 teachers ranging from elementary to the college level. Most workshops are carried out on college campuses. Deadline is in September.

PRE-FRESHMAN AND COOPERATIVE EDUCATION PROGRAM

- support to colleges and universities to seek out minority groups, women, and educationally and economic disadvantaged individuals during high school years and provide them with enrichment activities during the summer prior to their freshman year in college. Funds provide stipends during the summer and tuition costs during the freshman year. Deadline is in January.

SOLAR RESEARCH AND TRAINING CENTERS

- support for eight university-based Centers throughout the United States to set up solar training programs. Centers were selected in 1977 and are expected to be operational by September 1978. Each Center will offer courses for students and working professionals in solar energy related meteorology. The eight universities are: University of California, Davis; State University of New York, Albany; Georgia Institute of Technology, Atlanta; Trinity University, San Antonio; Oregon State University, Corvallis; University of Michigan, Ann Arbor; University of Alaska, Fairbanks; University of Hawaii-Manoa.

The information gathered on solar radiation and other meteorological data will be fed into the National Climatic Center at Asheville, North Carolina.

SPECIAL PROJECTS IN ENERGY EDUCATION AND TRAINING

- support for projects which demonstrate innovative ideas in energy education, but which do not fall within the guidelines of a specific program.

USED ENERGY-RELATED LABORATORY EQUIPMENT GRANTS

- awards of used energy-related equipment for use in colleges and universities in energy-oriented education programs. Lists of available equipment can be reviewed at seventeen Centers throughout the U.S. Institutions are responsible for locating the equipment, and then must prepare a proposal requesting the equipment. Typical equipment might include: radiation detectors; mass spectrometers; infrared spectrometers; gas and liquid chromatographs; catalyst test units; etc.

GRADUATE TRAINEESHIP PROGRAM

- provides financial assistance to colleges and universities, selected annually, for graduate-level training in energy-related fields, such as nuclear engineering, radiation, social sciences, conservation, and solar, geothermal and fusion technologies. Funding is somewhat uncertain at the time of this writing.

RESEARCH AND DEVELOPMENT IN NUCLEAR, SOLAR, GEOTHERMAL AND ADVANCED ENERGY SYSTEMS, AND PHYSICAL, BIOMEDICAL AND ENVIRONMENTAL SCIENCES (24.024)

- support for basic and applied research and development and demonstration undertaken to discover new knowledge in fields related to energy. Support is provided in a wide range of fields including biomedical, medical and environmental sciences; high energy physics, and nuclear physics; environmental control technology; and other energy-related areas. Proposals are judged on their scientific merit, relevance to energy research and development and possible contribution to knowledge; credentials and experience of the investigator; facilities to carry out the proposed research. Research is carried out at designated centers as well as colleges and universities. Size of grants varies widely. Proposals are accepted throughout the year.

RESEARCH IN BASIC ENERGY SCIENCES

- support for basic and applied research in nuclear, materials, chemical, sciences; engineering, mathematics and geosciences; and advanced energy projects. Applied mathematical sciences, geosciences and engineering sciences are areas of high priority. Proposals are judged on their scientific merit, relevance to energy research and development and possible contribution to knowledge; credentials and experience of the investigator; facilities to carry out the proposed research. Size of grants varies widely. Proposals are accepted throughout the year.

RESEARCH AND DEVELOPMENT IN FOSSIL ENERGY (24.034)

- support for novel ideas in fossil energy. Grants of up to $25,000 per year for two years to study high-risk, untried projects with long-term potential. Possible subject areas include fossil fuel combustion, enhanced oil and gas recovery, underground coal gasification, use of oil shale, waste heat recovery, etc.

RESEARCH AND DEVELOPMENT IN ENERGY CONSERVATION AND SOLAR APPLICATIONS (24.035)

- support for basic and applied research and development undertaken to enhance present technology and develop new knowledge and procedures in the field of energy conservation. Projects can be in any area relevant to energy conservation.

DOE also provides small grants for the purpose of development demonstration and dissemination of information on projects in energy-related systems and supporting technologies in selected priority areas. Maximum grants for concept research are $10,000; for development and for demonstration $50,000.

SOLAR ENERGY DEMONSTRATION PROJECTS

- grants of up to $600,000 to cover the incremental costs of installing a solar unit into non-residential buildings. Both new construction and renovation projects are eligible, but the solar system must not be under construction at the time of selection.

ENVIRONMENTAL PROTECTION AGENCY

Grants to support research projects in areas of interest to EPA. (Most research at EPA is carried out in-house or through RFP's.) Cost-sharing is required. EPA encourages contact with a program officer before submission of a proposal. Research and development at EPA is highly mission-oriented, concerned with solving specific priority problems rather than only advancing scientific knowledge, although the scope of some projects is quite fundamental.

ENVIRONMENTAL PROTECTION-CONSOLIDATED RESEARCH GRANTS (66.500)
- support for research for development of better systems for environmental management, including energy-related areas and pollution control. Grants range from $5,700 to $243,000. Approximately 190 grants are made each year. Applications are accepted throughout the year.

WATER POLLUTION CONTROL-RESEARCH, DEVELOPMENT AND DEMONSTRATION (66.505)
- support for research and development and demonstration projects relating to the causes, effects, extent, prevention and elimination of water pollution. Staff advises consultation before submission of a proposal. Awards range from $13,000 to $125,000; the average grant is $75,000. Approximately 120 grants are made each year. Applications can be made at any time.

SAFE DRINKING WATER RESEARCH AND DEMONSTRATION GRANTS (66.506)
- support for research related to causes, diagnosis, treatment and other impairments of man resulting from unsafe drinking water. Also support for projects to demonstrate new water purification techniques or to demonstrate reuse of water. Grants range from $14,220 to $782,504. The average grant is $80,000. Approximately 80 awards are made each year. Applications may be submitted at any time.

AIR POLLUTION CONTROL RESEARCH GRANTS (66.501)
- support for research and development projects relating to causes, effects, extent, prevention and control of air pollution. Approximately 75 grants averaging $73,000 are supported each year. Proposals may be submitted at any time.

PESTICIDES CONTROL RESEARCH GRANTS (66.502)
- support for research projects relating to human and ecological effects from pesticides, pesticide degradation products, and alternatives to pesticides. Approximately 35 grants averaging $55,000 are awarded each year.

SOLID WASTE DISPOSAL RESEARCH GRANTS (66.504)
- support for research and development in collection, storage, utilization, salvage or final disposal of solid waste. Approximately 12 grants, averaging $35,000, are made each year. Applications are selected at any time.

OFFICE OF EDUCATION

DOMESTIC MINING AND MINERAL FUEL CONSERVATION FELLOWSHIP PROGRAM (13.567)
- fellowships for graduate and professional study leading to an advanced

degree in domestic mining and mineral and mineral fuel conservation. Fellowships may be awarded for up to three years of study at any institution of higher education or research center approved by the Commissioner. Basic fellowship stipend is $3,000 for each academic year of study plus additional allowances for travel cost to and from the institution, and a dependency allowance. The institution at which the fellow is studying receives an allowance of 150 percent of the basic stipend. Approximately 375 fellowships are awarded each year. Funding for FY 1979 is uncertain.

ENVIRONMENTAL EDUCATION (13.522)

- support for development of innovative instructional materials and approaches for use in schools and communities, for training professionals in environmental education and for development of resource materials on specific environmental problems. Activities can include planning outdoor ecological study centers, preparation and distribution of materials for mass media and preservice and in-service training. Grants average $35,000. Mini-grants of $10,000 are available for workshops to assist communities in understanding local environmental problems. Approximately 90 awards are made each year, of which about 25 are to higher education institutions. Deadline is in January.

EDUCATION FOR USE OF THE METRIC SYSTEM OF MEASUREMENT (13.561)

- grants to support projects to serve as models for better methods of teaching the metric system. Most grants given to colleges and universities have been for teacher preservice and inservice training programs. Approximately 27 of the total 75 grants made the past year of funding went to colleges and universities Deadline is usually December.

DEPARTMENT OF INTERIOR

MINERAL RESEARCH AND RESOURCE INFORMATION AND TECHNICAL ASSISTANCE (15.304)

- dissemination of technical information on mineral production and consumption; information regarding the economic situation of the mineral industry; information for guidance in transportation and utilization of coal and related products. Technical assistance and advice on efficient use of mineral resources and environmental problems related to minerals and mining is also available.

GEOLOGIC AND MINERAL RESOURCE SURVEY AND MAPPING (15.800)

- dissemination of information and assistance to states on geologic mapping information and research on principles of geology, geophysics, and geochemistry.

CARTOGRAPHIC INFORMATION (15.801)

- provides cartographic information to federal and state agencies and general public. Information includes maps, charts, geodetic control, aerial and space imagery, and related cartographic data generated by Federal, state and local sources.

TOPOGRAPHIC SURVEYS AND MAPPING (15.803)

- performs work on cooperative projects with states which contribute to the National Mapping Program. This program is designed to provide basic information for the effective planning and development of programs in management of natural resources. Technical information is available.

WATER RESOURCES INVESTIGATIONS (15.804)
- cooperative projects in hydrology with states and local government to provide best use of water resources. Technical information is available.

SMITHSONIAN INSTITUTION

SMITHSONIAN INSTITUTION PROGRAMS IN BASIC RESEARCH AND PUBLIC EDUCATION (60.001)
- use of property, facilities, equipment, services, technical assistance in the many areas of Smithsonian expertise, including natural sciences. Libraries contain important collections and documents available for use by qualified researchers.

SMITHSONIAN HIGHER EDUCATION AND RESEARCH TRAINING PROGRAMS (60.002)
- fellowships for investigators who seek training in research supplementary to their disciplinary studies, to work with the staff of the Smithsonian. Applicants must indicate why the Smithsonian is the best place to carry out the proposed research in Natural Sciences, History of Science and other areas in which the Smithsonian has expertise. There are three levels of fellowships:

1. Postdoctoral Fellowships - stipends of $12,000 per year, for a six to twelve month tenure, to postdoctoral scientists and scholars within five years of their Ph.D. Approximately 20 awards are made each year. Deadline is in January for appointments beginning in September.
2. Predoctoral Fellowships - stipends of $7,000 per year to investigators engaged in dissertation research. Approximately 25 awards are made each year. Deadline is September.
3. Graduate and Undergraduate Fellowships - stipends of $1,000 for a ten week appointment at the Smithsonian. About 14 awards are made each year. The deadline is March.

Short term visits for students and scholars seeking access to the Smithsonian facilities and staff can be arranged.

CHESAPEAKE BAY CENTER FOR ENVIRONMENTAL STUDIES (60.004)
- use of Center and facilities for predoctoral and postdoctoral researchers, visiting scientists and qualified groups who are pursuing specific studies or educational programs. Education programs are oriented toward development of learning strategies and methods for environmental education purposes. Educational programs are open to children and adult groups on an appointment basis. Inquiries can be made at any time.

SMITHSONIAN SCIENCE INFORMATION EXCHANGE (60.009)
- serves as a clearinghouse of ongoing research supported by government and non-government agencies. Total annual collection of research records varies from 110,000 to 125,000. Each record includes the name of the supporting agency, names of principal and associate investigators, location of work, level of effort, dates of active work, and short description of the work. Indices and

cross-references are maintained in order to answer a variety of questions. Fee schedules are available.

SMITHSONIAN SPECIAL FOREIGN CURRENCY PROGRAM (60.016)

- grants to higher education institutions for research in systematic and environmental biology, and atmospheric and earth sciences, archeology and other areas. Cost of research must be met with foreign currencies expended in the country where research is being carried out. Funds may be used for travel costs, salaries, food, lodging, etc. Collaborative efforts between an American institution and an institution in the host country are eligible. Most grants are within the $10,000 to $50,000 range. Approximately 42 projects are supported each year. Deadline is November.

VISITING RESEARCH APPOINTMENTS IN ASTROPHYSICS, GEODESY, METEORITES AND SPACE SCIENCES (60.019)

- academic appointments to work in the Smithsonian Astrophysical Observatory. Research projects must be approved by the Smithsonian. Use of equipment and facilities is available on a short term basis.

DEPARTMENT OF STATE

FULBRIGHT-HAYS EDUCATION EXCHANGE-UNIVERSITY LECTURERS (PROFESSORS) AND RESEARCH SCHOLARS (19.102)

- grants for research or lectureships for up to one year in a foreign country. Grants usually provide round-trip transportation, maintenance allowance which varies with each country, and a small incidental allowance. Lecturers must have college or university teaching experience; researchers must have a doctorate or recognized professional standing. Competitiveness varies with country and discipline. Approximately 450 awards are made for lectureships and 140 for research each year. Deadline is June for Australia, New Zealand and American Republics and July for Africa, Asia and Europe.

FULBRIGHT-HAYS PROGRAM FOR SCHOLARS ABROAD

- grants to colleges and universities for travel of foreign scholars to spend three to twelve months for lecturing or in research at the host institution. Council for International Exchange of Scholars administers the program. The host institution is responsible for maintenance. Approximately 500 scholars in a wide range of disciplines from abroad come to the U.S. under this program each year. Deadline is in October for the following academic year.

Foreign scholars visiting the U.S. are often available to give lectures at other institutions in the U.S. The Council publishes a directory of visiting scholars and will help arrange such short-term visits.

AGENCY FOR INTERNATIONAL DEVELOPMENT INTERN PROGRAM

- two year training program which leads to positions in developing countries of Asia, Africa, Latin America and the Near East. Individuals holding advanced degrees in civil engineering as well as social science fields are eligible. Training in Washington lasts approximately six months with the remainder of the 24 spent on overseas duty. Applicants should hold advanced degrees in appropriate field. Most positions require language proficiency in French or Spanish.

Interdisciplinary backgrounds with science, business or economics are helpful. Deadline is usually in November of the year preceding the Fall appointment.

TECHNOLOGY APPLICATIONS FOR LESS-DEVELOPED COUNTRIES (19.007)

- contracts to higher education institutions for research in developmental problems in areas such as agriculture, nutrition and other areas to make foreign assistance programs more effective. Size of awards varies from $5,000 to over $1 million. Research projects are generally carried out at large research institutions.

INSTITUTIONAL CENTERS TO AID FOREIGN DEVELOPMENT

- grants to institutions to strengthen programs which can contribute to AID program in long-range economic and social developments in developing countries. Grants are to augment an on-going program at an institution by building upon existing skills and knowledge, not to develop new capabilities. Agriculture, engineering, economics and other social science areas are included. There are no formal guidelines; an institution should outline its plan in a preliminary proposal to the agency. The largest portion of funding is awarded for activities in the area of food and nutrition. Grants average $500,000 and are made for periods up to five years.

DEPARTMENT OF TRANSPORTATION

URBAN MASS TRANSPORTATION GRANTS FOR UNIVERSITY RESEARCH AND TRAINING (20.502)

- grants for research and research training in the problems of transportation in urban areas. Total value of grants in the program is approximately $2 million per annum. Grants average $75,000. Proposals are accepted throughout the year.

MASS TRANSPORTATION TECHNOLOGY (20.504)

- grants and contracts for projects with widespread applicability to reduce problems and improve services in urban mass transportation. Areas of high priority include central city revitalization, accessibility for the elderly and handicapped, energy conservation and environmental protection. Most projects are large-scale, multi-year efforts.

URBAN MASS TRANSPORTATION DEMONSTRATION GRANTS (20.506)

- grants and contracts to support demonstration projects of new facilities, equipment, techniques and methods in an operational environment to improve urban mass transportation and improve service. Expected results of a research project should have widespread applicability. Range of assistance varies widely.

Related publications of the Federal Resources Advisory Service include:

Federal Grants: A Basic Handbook
A Directory of Selected Federal Program Offices
A Guide to Federal Funding in the Arts and Humanities
A Guide to Federal Funding in the Biological Sciences
A Guide to Federal Funding in the Social Sciences
A Guide to Federal Funding for Education, Libraries and Other Institutional Programs
A Guide to Federal Funding for Health Programs